Answer **ALL** questions. Each question is worth **20 points**. Total points are **100 points**.

Question 1

Write a function named `rate_my_movie` that takes an integer between 1 and 5 as an argument and returns a string of stars (*) representing a movie's rating. One star (*) is the lowest rating, and 5 stars (*****) is the highest rating.

Examples:

- If the integer is 2, the function should return **.
- If the integer is 4, the function should return ****.

Question 2

Write a program that, given a list of strings, sequentially prints out the upper case version of each string in the list preceded by the string's length.

For instance, given the list `["This", "is", "a", "short", "sentence"]` the program should print out

```
4 THIS
2 IS
1 A
5 SHORT
8 SENTENCE
```

Or given the list `["Another", "sentence"]`, it should print out

```
7 ANOTHER
8 SENTENCE
```

Question 3

Write a function that takes as an argument a string of alternating digits (1 to 9) and letters, and returns a converted version of the string where each letter is repeated an amount of times indicated by the preceding digit.

Examples:

- If 3A is the original string, the function should return AAA
- If 1B is the original string, the function should return B
- If 3T2D1E is the original string, the function should return TTTDDE
- If 2M1G3E2W4O is the orginal string, the function should return MMGEEEWWOOOO

Question 4

The comma-separated values file "expenditure_data.csv" contains cross-sectional survey data on expenditure, income, and other characteristics of British households. In particular, the following variables are present in the dataset:

- **expenditure**: Weekly total household expenditure
    - Values: numerical
- **income**: Weekly household income
    - Values: numerical
- **maininc**: Main source of household income
    - Values: {'earnings', 'other so'}
- **region**: Region of residence
    - Values: {'East Mid', 'London', 'South Ea', 'Eastern', 'Scotland', 'Northern', 'Wales', 'Yorkshir', 'West Mid', 'South We', 'North We', 'North Ea'}
- **nadults**: Number of adults in household
    - Values: {'1 adult', '2 adults', '3 adults', '4 and mo'}
- **nkids**: Number of kids in household
    - Values: {'No child', 'One chil', 'Two or m'}
- **SexHRP**: Sex of Household Reference Person
    - Values: {'Female', 'Male'}
- **housing**: Housing tenure
    - Values: {'Public r', 'Owned', 'Private'}
- **internet**: Internet connection in household
    - Values: {1: Internet connection is present, 0: Internet connection is not present}

Using the Pandas library, import the CSV file and create a data frame named df_exp. Then, write the code necessary to perform the following tasks:

1. Display the first 25 observations in the data frame.

2. Show the number of households without an internet connection.

3. Compute the difference between the mean weekly income in London and the mean weekly income in the rest of the U.K.

4. Compute the percentage of households with weekly savings above £300 in Scotland and Wales. Households' weekly savings are defined by the difference between weekly income and expenditure.

5. For each region, compute the average and median number of children per household. To simplify the analysis, you can assume that the value "Two or m" of the "nkids" variable stands for 2 children exactly.

You may write the code for each of the above tasks in different Jupyter notebook cells. Also, you may modify existing variables, or create and add additional ones to the data frame where necessary.

Question 5

You have been hired as a programmer by a supermarket chain and your first job is to write the software for the "scan as you shop" hand scanners used by customers to track the cost of the basket during their shopping.

The table below summarises the information on all products available on the supermarket shelves:

Product	Price	Loyalty card	3 for £10
Pizza	£4.50	Yes	Yes
Bread	£1.50	Yes	No
Steak	£5.00	No	Yes
Chicken	£3.50	Yes	Yes
Water	£2.00	No	No
Wine	£6.00	Yes	No
Beer	£4.00	No	Yes
Cola	£3.50	Yes	Yes
Toothpaste	£2.00	No	No
Soap	£1.75	Yes	No

where

- **Loyalty card** indicates which products apply for a 5% discount at the checkout in case the customer is in possession of a loyalty card.
- **3 for £10** indicates which products apply for a "buy any 3 and pay £10 only" promotion.

When a product applies for both promotions, the loyalty card price discount only applies to those units that are not using the "3 for £10" promotion.

Examples:

- When you buy 4 steaks, 3 of them will cost £10 and 1 full price.
- When you buy 8 pizzas, 6 of them will cost £20 and 2 will cost the reduced price given by the loyalty card if applicable.

Write a program that interactively prompts the customer to

- Select which product they want to add to the basket and in which quantity
- Select which product (if any) they want to remove from the basket and in which quantity
- Choose whether they have concluded their shopping

The program should display the updated cost of the basket whenever a product is added or removed, and print a final receipt at the end of the shopping displaying the cost of each product along with the savings from any used promotion.